

*Excellence in Electronics***TYPE  
CK6100/  
6C4WA**

The CK6100/6C4WA is a heater-cathode type medium-mu triode of miniature construction, suitable for use as a class c amplifier and oscillator. This type is characterized by long life and stable performance. It is designed for service where conditions of high temperature and mechanical shock or vibration are encountered.

**MECHANICAL DATA**ENVELOPE: T-5 1/2 GlassBASE: Miniature Button Base 7-PinTERMINAL CONNECTIONS:

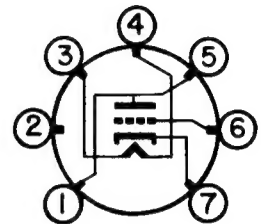
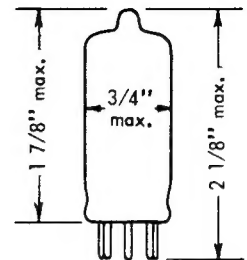
Pin 1 Plate	Pin 5 Plate
Pin 2 Internal connection	Pin 6 Grid
Pin 3 Heater	Pin 7 Cathode
Pin 4 Heater	

MECHANICAL RATINGS:

Maximum Impact Acceleration (Shock Test---Note 3)	450 G
Maximum Vibrational Acceleration (100 Hour Fatigue Test---Note 4)	2.5 G
Maximum Bulb Temperature	165 °C

MOUNTING POSITION: Any**ELECTRICAL DATA**

CAUTION-----To Electronic Equipment Design Engineers: Special attention should be given to the temperature at which the tubes are to be operated. Reliability will be seriously impaired if maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions other than those specified for life test are imposed on the tube and will be reduced appreciably if absolute maximum ratings are exceeded. Both reliability and performance will be jeopardized if filament voltage ratings are exceeded. Life and reliability of performance are directly related to the degree that regulation of the heater voltage is maintained at its center rated value.



BOTTOM VIEW

6BG

**RATINGS AND  
NORMAL OPERATION:**

	MIL-E-1B SYMBOL	ABSOLUTE MINIMUM	NORMAL TEST CONDITIONS (Note 6)	NORMAL OPERATION (Note 5)	ABSOLUTE MAXIMUM	MIL-E-1B UNITS
Heater Voltage (Note 7)	Ef:	5.7	6.3	6.3	6.9	V
Plate Voltage	Eb:	----	250	100	250	Vdc
Grid #1 Voltage	Ec1:	----	-8.5	0	-8.5	Vdc
Plate Dissipation	Pp:	----	----	1.2	2.6	W
Grid #1 Circuit Resistance	Rg1:	----	----	----	1.2	Meg.
Grid Current	Ic:	----	----	----	5.5	mA
Heater-Cathode Voltage	Ehk:	-200	----	----	+200	Vdc
Plate Current (Note 9)	Ib:	----	----	11.8	10.5	mA

**CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1)**

TEST	CONDITIONS	AQL %	MIL-E-1B SYMBOL	MIN.	LAL	BOGIE	UAL	MAX.	ALD	MIL-E-1B UNITS
<b>ACCEPTANCE TESTS - GROUP C</b>										
Continuity and Shorts (Inoperatives):		0.4								
<b>ACCEPTANCE TESTS - GROUP D</b>										
Combined AQL = 1.0 %										
Heater Current:		0.65	If:	138	----	150	----	162	----	mA
Heater-Cathode Leak - age:	Ehk = +100 Vdc Ehk = -100 Vdc	0.65	Ihk: Ihk:	----	----	----	----	10 10	----	μAdc μAdc



## RELIABLE TRIODE

## ELECTRICAL DATA (cont'd)

## CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1) (cont'd)

TEST	CONDITIONS	AQL %	MIL - E - 1B SYMBOL	MIN.	LAL	BOGIE	UAL	MAX.	ALD	MIL - E - 1B UNITS
<b>ACCEPTANCE TESTS - GROUP D (cont't)</b>										
Grid Current:	Rg= 0.1 meg.	0.65	Ic (1):	----	----	----	----	-0.5	----	$\mu$ Adc
Plate Current (1):		0.65	Ib (1):	6.5	9.0	10.5	12.0	14.5	3.5	mAdc
Transconductance (1):		0.65	Sm (1):	1750	2000	2200	2400	2650	450	$\mu$ mos
<b>ACCEPTANCE TESTS - GROUP E</b>										
Insulation of Electrodes:	Ef= 6.3 V									
	Eg - all= -100 Vdc	2.5	Rg1 - all:	100	----	----	----	----	----	Meg.
	Ep - all= -300 Vdc		Rp - all:	100	----	----	----	----	----	Meg.
Plate Current (2):	Ec1= -25 Vdc	2.5	Ib (2):	----	----	----	----	20	----	$\mu$ Adc
Plate Current (3):	Ec1= -18 Vdc	2.5	Ib (3):	5	----	----	----	----	----	$\mu$ Adc
Transconductance (2):	Ef= 5.7 V	2.5	$\Delta$ Ef Sm (2):	----	----	----	----	15	----	%
Transconductance (3):	Ec1= 0; Eb= 100 Vdc;	2.5	Sm (3):	2500	2900	3250	3600	4000	800	$\mu$ mos
Grid Current (2):	Eb= 250 Vdc; Rg= 0.5	2.5	Ic (2):	----	----	----	----	-1.0	----	$\mu$ Adc
	Rk= 470 ohms; Ec1=									
	0; After 5 minutes at									
	Ef= 7.0 V measure grid									
	current at Ef= 7.0 V;									
	3 minutes test not									
	permitted.									
RF Noise:	Ecal= 15 mVac	2.5	-----	----	----	----	----	3.0	----	mW
Noise and	Eb= 250 Vdc; Ec1=	2.5	Ep:	----	----	----	----	25	----	mVac
Microphonics:	-8.5 Vdc; Rk= 0;									
	Rp= 10,000; Ef= 6.3									
	Vac= Ehk= 0									
<b>ACCEPTANCE TESTS - GROUP F</b>										
Vibration (2):	Rp= 2000 ohms; Rg=	6.5	Ep:	----	----	----	----	50	----	mVac
	0.1 meg.									
Amplification Factor:		6.5	Mu:	15.5	16.2	17.0	17.8	18.5	1.8	
Capacitance:			Cgp:	1.2	----	1.6	----	2.0	----	$\mu$ ft
Capacitance:	Note 2	6.5	Cin:	1.35	----	1.8	----	2.25	----	$\mu$ ft
Capacitance:			Cout:	0.98	----	1.3	----	1.62	----	$\mu$ ft
Low Pressure	Pressure= 55 $\pm$ 5 mm Hg:	6.5	----	----	----	----	----	----	----	----
Voltage Breakdown:	Voltage= 500 Vac									
<b>ACCEPTANCE TESTS - GROUP A</b>										
Shock:	Ehk= 100 Vdc; Rg= 0.1	20	-----	----	----	----	----	----	----	----
	Meg.; Hammer Angle=									
	30°; Note 3									
Fatigue:	96 hours; G= 2.5; Fixed	6.5	-----	----	----	----	----	----	----	----
	frequency; F= 25 min. 60									
	max. (Note 4)									
Post Shock and Fatigue										
Test End Points:										
Vibration (2):	F= 25 Cps; G= 2.5; Rp=	----	Ep:	----	----	----	----	100	----	mVac
	2000 ohms									
Heater - Cathode	Ehk= +100 Vdc	----	Ihk:	----	----	----	----	15	----	$\mu$ Adc
Leakage:	Ehk= -100 Vdc	----	Ihk:	----	----	----	----	15	----	$\mu$ Adc
Transconductance (1):		----	Sm (1):	1500	----	----	----	2650	----	$\mu$ mos
Grid Current (1):		----	Ic (1):	----	----	----	----	-1.0	----	$\mu$ Adc
<b>ACCEPTANCE TESTS - GROUP B</b>										
Glass Strain (Thermal Shock):		2.5	----	----	----	----	----	----	----	----
TEST	CONDITIONS	AQL %	MIL - E - 1B SYMBOL	MIN.	MAX.	MIL - E - 1B UNITS	Maximum Defects per Characteristic			
<b>ACCEPTANCE LIFE TEST</b>							1st Sample	Combined Sample		
Heater Cycling:	Ef= 7.5 V; Ehk= +135	----	-----	2000	----	Cycles				
	Vdc; Eb= Ec= 0; 1 min. on,									
	1 min. off									
Heater Cycling Life		----	-----	----	----	-----				
Test End Points:										
Heater - Cathode	Heater Positive	----	Ihk:	----	20	$\mu$ Adc				
Leakage:	Heater Negative	----	Ihk:	----	20	$\mu$ Adc				

RAYTHEON MANUFACTURING COMPANY

RECEIVING AND CATHODE RAY TUBE OPERATIONS



## RELIABLE TRIODE

## ELECTRICAL DATA (cont'd)

TEST	CONDITIONS	AQL %	MIL - E - 1B SYMBOL	MIN.	MAX.	MIL - E - 1B UNITS	Maximum Defects per Characteristic	
							1st Sample	Combined Samples
<b>ACCEPTANCE LIFE TEST (cont'd)</b>								
1 Hour Stability Life Test:	TA=room; Ehk=+135 Vdc. Rg=0.5 Meg; Rk=470 ohms Ec1=0.	----	-----	----	----	----		
1 Hour Stability Life Test End Points:								
Transconductance (1) change of individual tubes from initial:	(Typical Sample Size=50 tubes)	1.0	$\Delta S_m(1)$ :	----	10	%		
100 Hour Survival Rate Life Test:	TA=room; Ehk=+135 Vdc; Rg1=0.5 Meg; Rk=470 ohms; Ec1=0.	----	-----	----	----	----		
100 Hour Survival Rate Life Test End Points:								
Inoperatives:	(Typical Sample Size= 200 Tubes)L	0.65	-----	----	----	----		
500 and 1000 Hour In - termittent High Temp - erature Life Test:	T Bulb=165 °C; Ehk= +135 Vdc; Rk=470 ohms; Ec1=0; Rg1=0.5 Meg.							
500 Hour Intermittent High Temperature Life Test End Points:	(Typical Sample Size=20 tubes 1st sample, 40 tubes 2nd sample, Total Allowable combined defects=4 tubes 1st sample, 8 tubes 1st and 2nd samples).	----	-----	----	----	----		
Inoperatives		----	-----	----	----	----	1	3
Heater Current		----	If:	138	162	mA	1	3
Heater - Cathode Leakage		----	Ihk:	----	10	$\mu$ Adc	1	3
Grid Current (1)		----	Ic (1):	0	-0.5	$\mu$ Adc	1	3
Transconductance (1)		----	Sm (1):	1600	2650	$\mu$ mos	1	3
Transconductance (1)		----	Ave. $\Delta S_m(1)$ :	----	15	%		
Average change (Note 10)								
Electrode Insulation (g-all)		----	Rg-all:	50	----	Meg.	2	5
(p-all)		----	Rp-all:	50	----	Meg.		
Transconductance (2) (Note 8)		----	$\Delta S_m(2)$ :	----	15	%	2	5
1000 Hour Intermittent High Temperature Life Test End Points:	(Typical Sample Size= 20 tubes 1st sample, 40 tubes 2nd sample)	----	-----	----	----	----		
Inoperatives:		----	-----	----	----	----	2	5
Heater Current		----	If:	138	162	mA	2	5
Heater - Cathode Leakage		----	Ihk:	----	10	$\mu$ Adc	2	5
Grid Current (1)		----	Ic (1):	0	-0.5	$\mu$ Adc	2	5
Transconductance (1)		----	Sm(1):	1500	2650	$\mu$ mos	2	5

## NOTES:

Note 1: Characteristics, Quality Control Test Procedures, and Inspection Levels are made according to the appropriate paragraphs of MIL - E - 1B, "Inspection Instructions for Electron Tubes," and MIL - STD - 105A.

Note 2: Without Shield.

Note 3: Test Conditions and Acceptance Criteria per Shock Test procedures of MIL - E - 1B basic specifications.

Note 4: Test Conditions and Acceptance Criteria per Fatigue Test procedures of MIL - E - 1B basic specifications.

Note 5: These normal values represent conditions at which control of reliability may be expected.

Note 6: These normal test conditions are used for all characteristics unless otherwise stated under the individual test item.

Note 7: For most applications the performance will not be adversely affected by  $\pm 10\%$  heater voltage variation, but when the application can provide a closer control of heater voltage, an improvement in reliability will be realized.

Note 8: Change of transconductance for individual tubes from that value measured at Ef=6.3 V to that value measured at Ef=5.7 V.

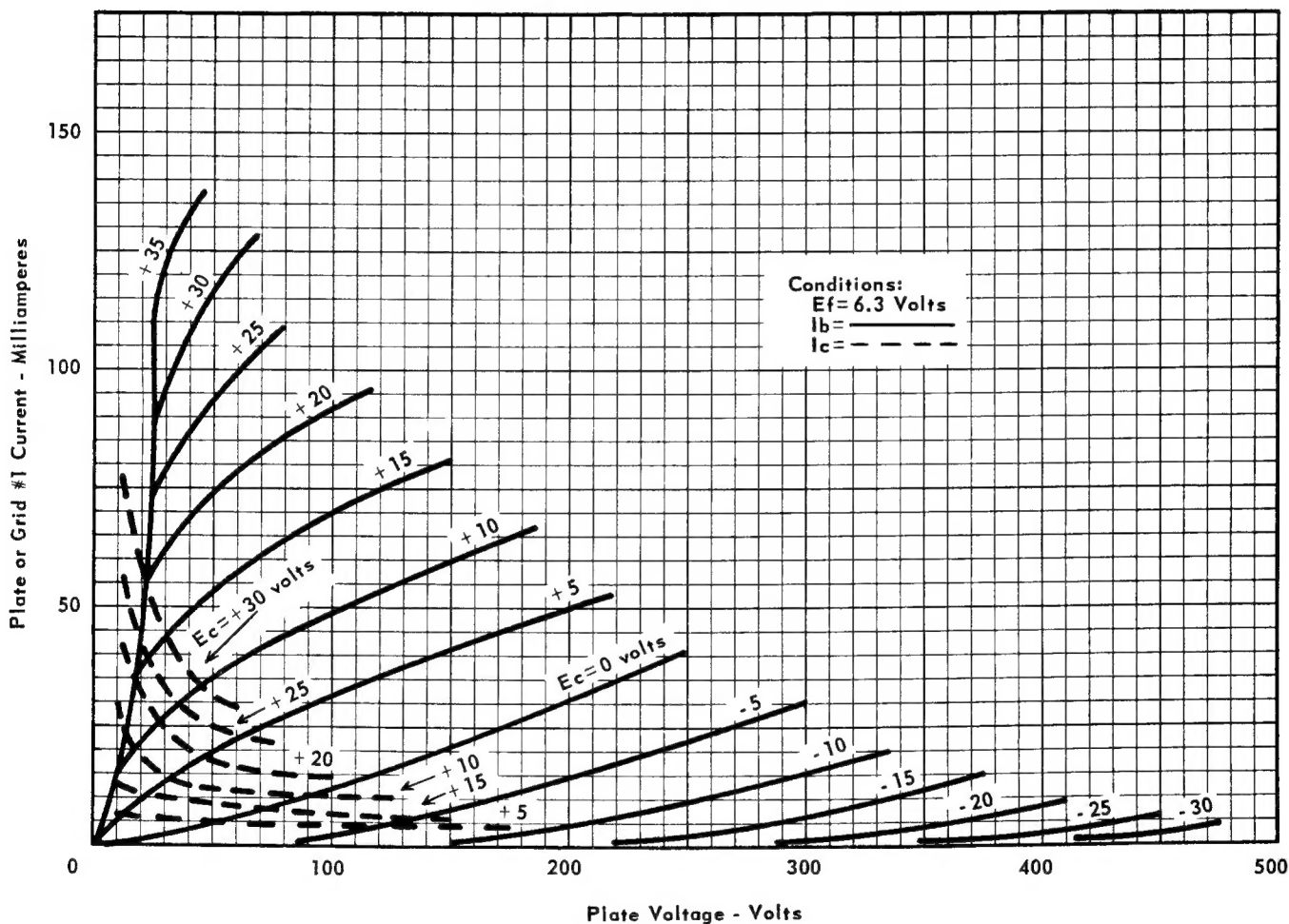
Note 9: Difficulty may be encountered if this tube is operated for long periods of time with very small values of cathode current.

Note 10: The average percentage change shall be ascertained from the determination of the individual changes for each tube (inoperatives excluded) from the zero hour value for the referenced characteristic.



RELIABLE TRIODE

AVERAGE PLATE CHARACTERISTICS



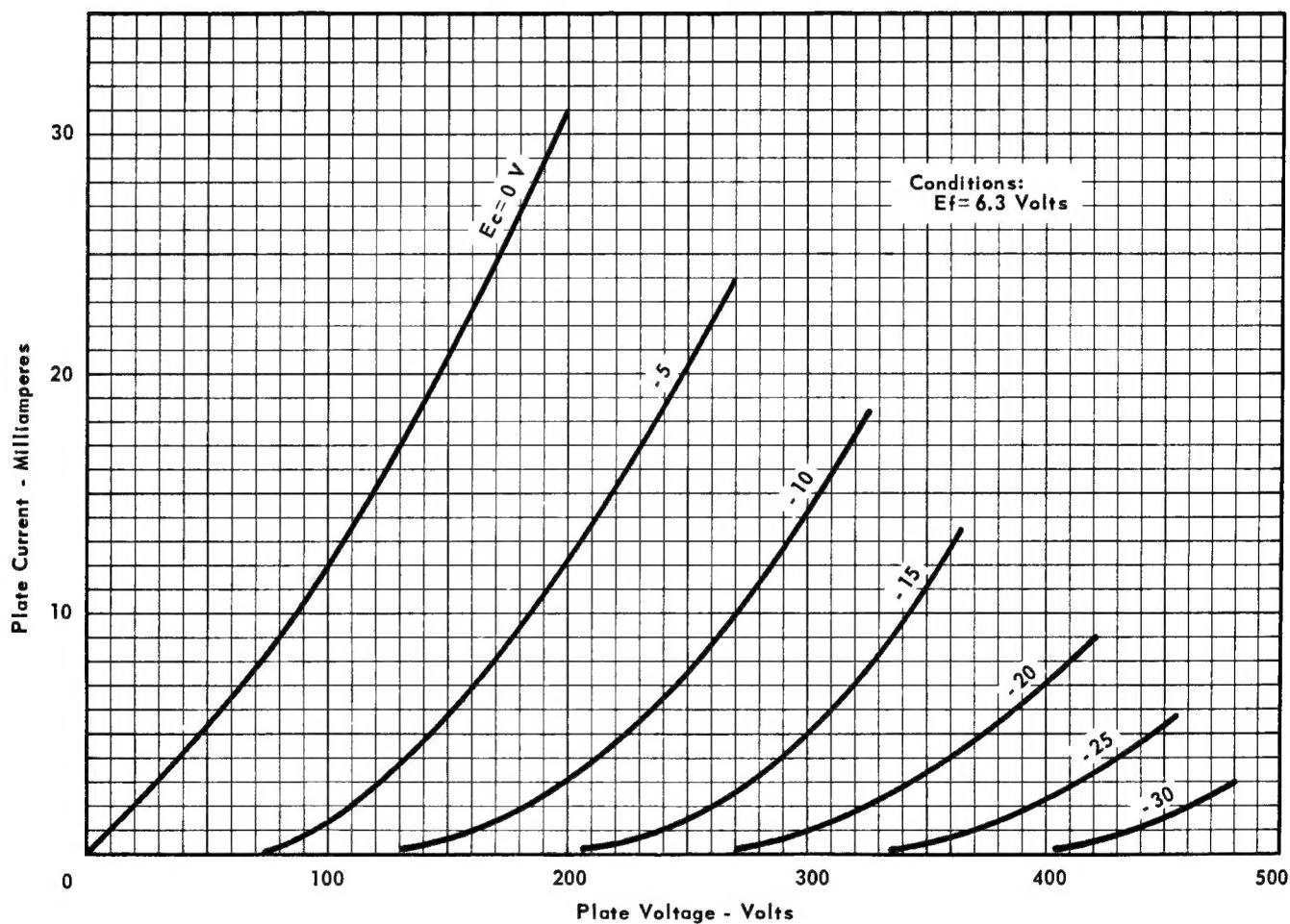
RAYTHEON MANUFACTURING COMPANY  
 RECEIVING AND CATHODE RAY TUBE OPERATIONS



TYPE CK6100 /  
6C4WA

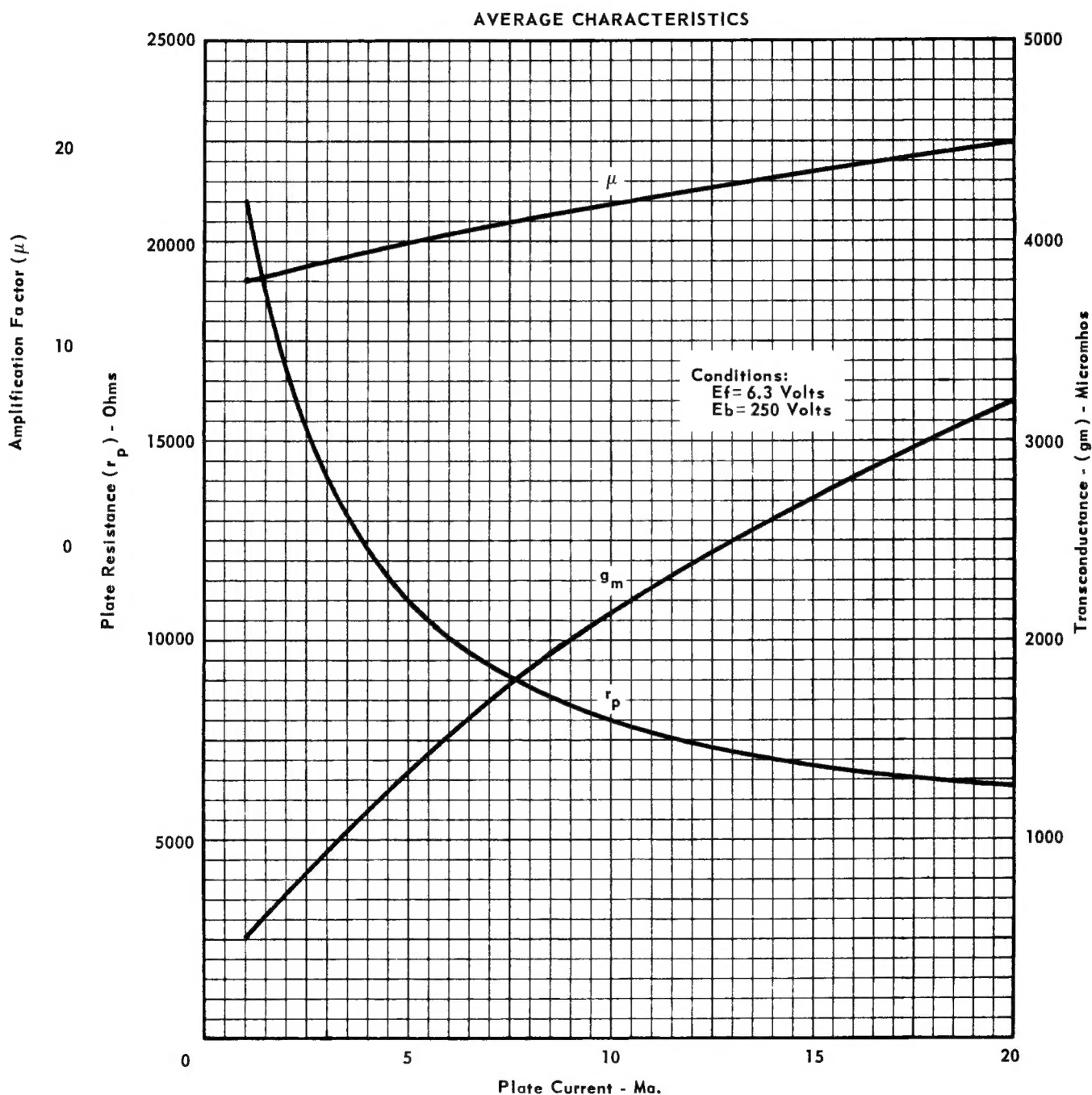
## RELIABLE TRIODE

AVERAGE PLATE CHARACTERISTICS





RELIABLE TRIODE



RAYTHEON MANUFACTURING COMPANY

RECEIVING AND CATHODE RAY TUBE OPERATIONS



TYPE CK6100 /  
6C4WA

RELIABLE TRIODE

AVERAGE CHARACTERISTICS

